



# INSTITUTE FOR CHILDREN'S ENVIRONMENTAL HEALTH

LOOKING UPSTREAM: COLLABORATING TO PREVENT TOXIC THREATS  
TO CHILD DEVELOPMENT

Washington State Public Health Association Meeting  
October 4, 2004

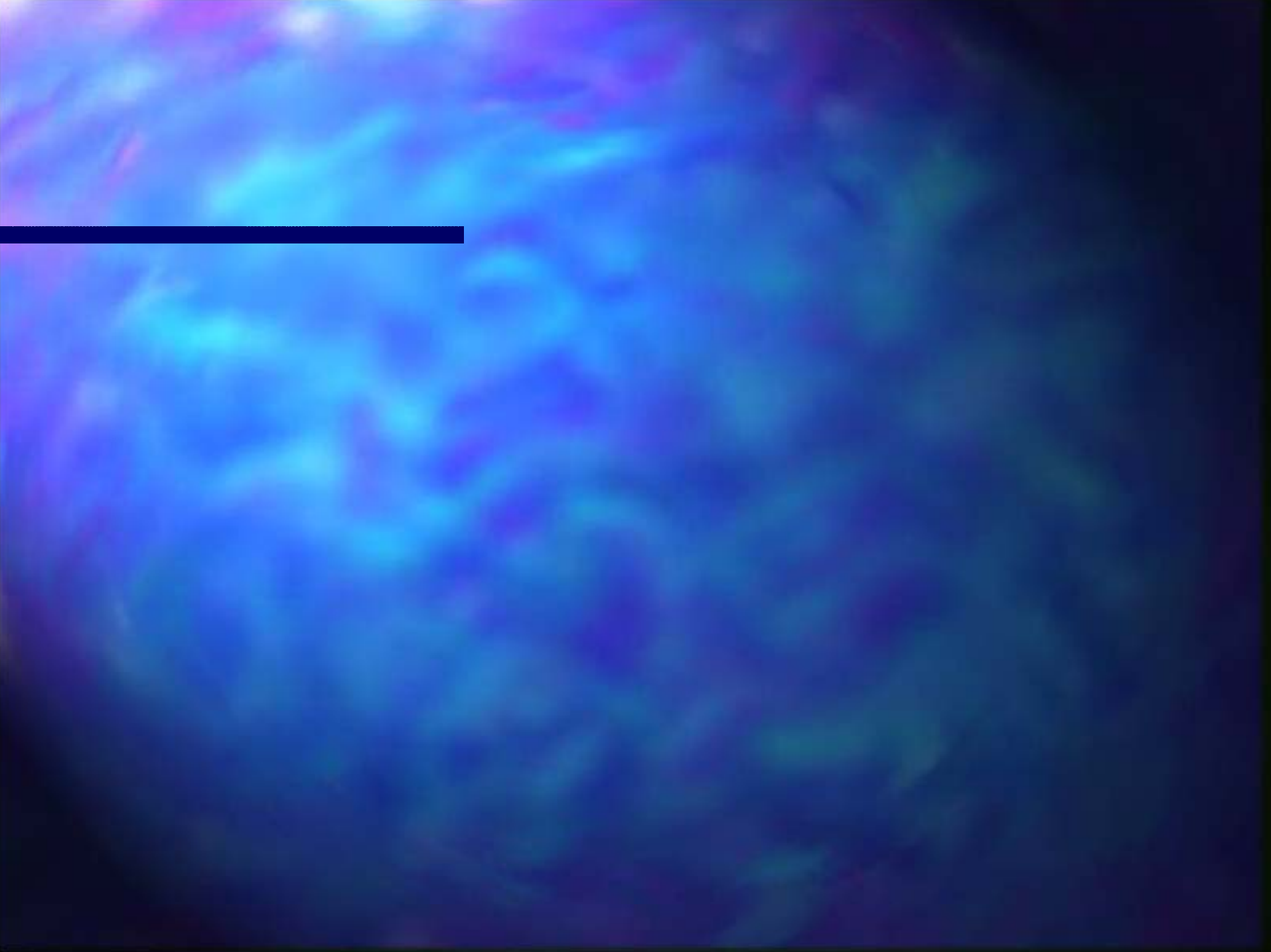
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# Summary Slide

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- Topic 1



# CONCERNING STATISTICS

- **CHILDHOOD ASTHMA**-doubled since 1980 and tripled for kids under the age of five (two CDC studies in 1996, 1998)
- **BIRTH DEFECTS**-remains leading cause of infant death (CDC, 1998)
- **CHILDHOOD LEUKEMIA AND BRAIN CANCER**-have been increasing since the 1970s (J. Natl Cancer Inst, 1999)
- **LEARNING AND DEVELOPMENTAL DISABILITIES COMBINED**-est. 12 million children in U.S. suffer from one or more learning, developmental or behavioral disorder (J. of Pediatrics, 1994)
- **MENTAL RETARDATION**-affects 1.4 million children under 18 (AAMR, 2003)
- **AUTISM SPECTRUM DISORDER** - affects 450,000 children under the age of 18 and appears to be 10x more prevalent than in the 1980s (JAMA, 2003)

# Costs to Society

- Illiteracy
- Drop-out rate
- Crime
- Violence & abuse
- Unemployment
- Health care
- Special education



# Economic Costs of Pediatric Environmental Diseases

## Estimated Costs of Pediatric Disease of Environmental Origin, United States, 1997 (billions)

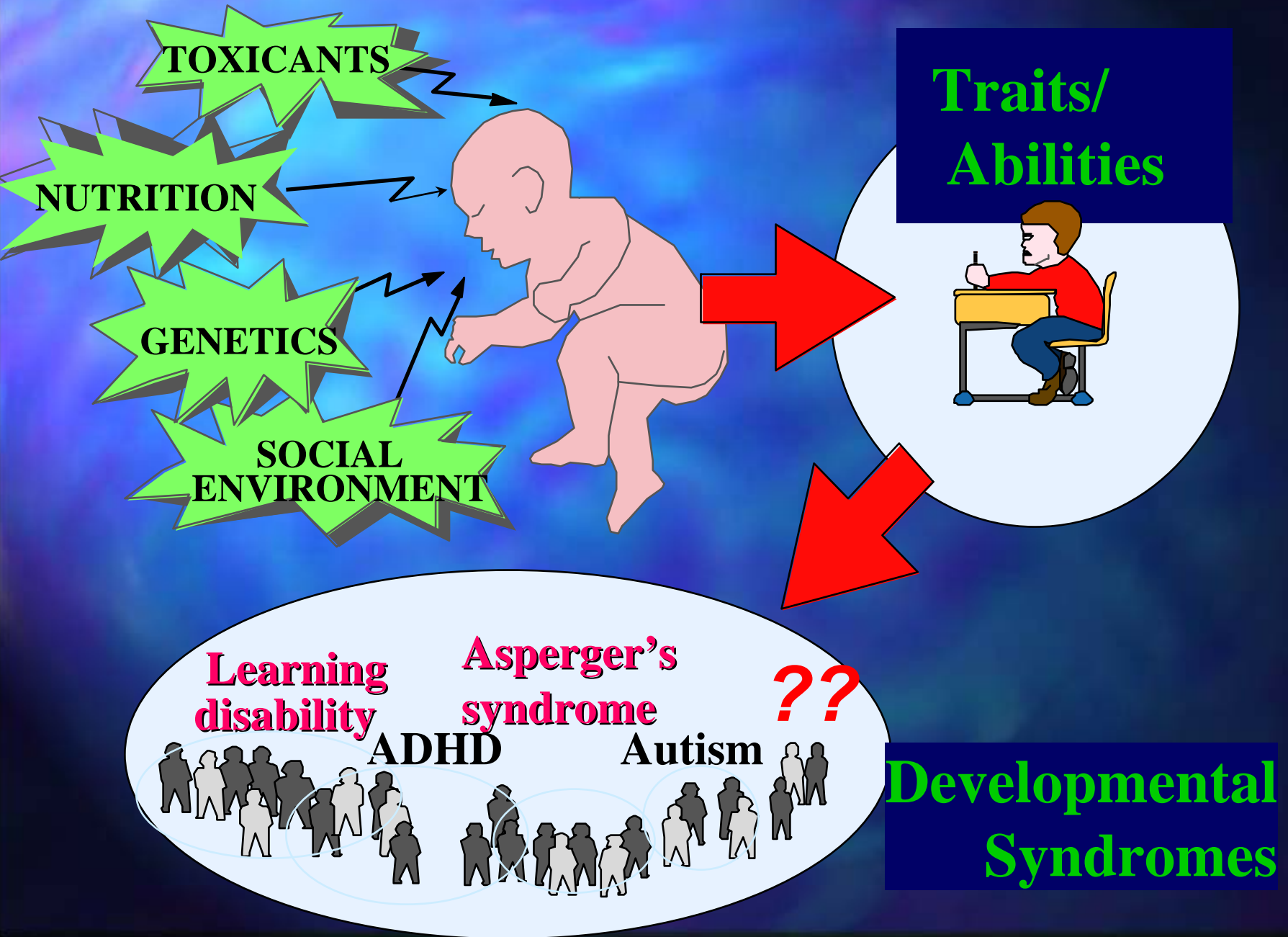
	Best Estimate	Low Estimate	High Estimate
Lead Poisoning	\$43.4	\$43.4	\$43.4
Asthma	\$2.0	\$0.7	\$2.3
Cancer	\$0.3	\$0.2	\$0.7
Neurobehavioral Disorders	\$9.2	\$4.6	\$18.4
<b>TOTAL</b>	<b>\$54.9</b>	<b>\$48.8</b>	<b>\$64.8</b>

(From "Environmental Pollutants and Disease in American Children," Landrigan, Schechter, et.al., 1997)

# New study in MA

- **Costs of Preventable Childhood Illness: The Price We Pay for Pollution, Rachel Massey, MSc, MPA & Frank Ackerman, PhD, 9/03. (<http://ase.tufts.edu/gdae>)**
  - Estimate of direct and indirect costs ranges from \$1.1 to \$1.6 billion annually in Massachusetts.

# FRAMEWORK FOR UNDERSTANDING

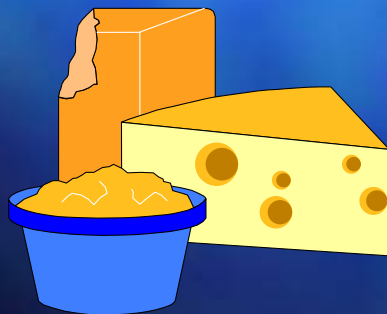
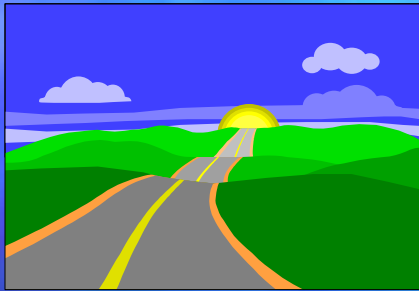


# 80,000 chemicals put on market since WW II



- Of 15,000 most in use, no toxicity data for 43 % (EPA)
- Complete neurotoxic data for only 12 chemicals (EPA)
- 1.2 - 5 billion tons of chemicals discharged annually in the U.S.
- 1500 -2500 new chemicals each year

# How Are People Exposed to Toxic Chemicals?



- Air, water and food
- Some toxicants are persistent in the environment and bioaccumulate
- Dispersion of chemicals is global--we all live downstream

# Child Health Exposures

## ■ Prenatal

- developmental windows
- transplacental



## ■ Post natal

- pound per pound children eat, drink and breath far more than adults
- prolonged gastric emptying
- increased metabolic rate
- increased time indoors & on floors
- breast milk

# Known Neurodevelopmental Toxicants

Includes certain:

- Pesticides
- Solvents
- Dioxins and PCBs
- Metals (lead, mercury, cadmium, manganese)
- Alcohol
- Nicotine



# Examples of Chemical Effects

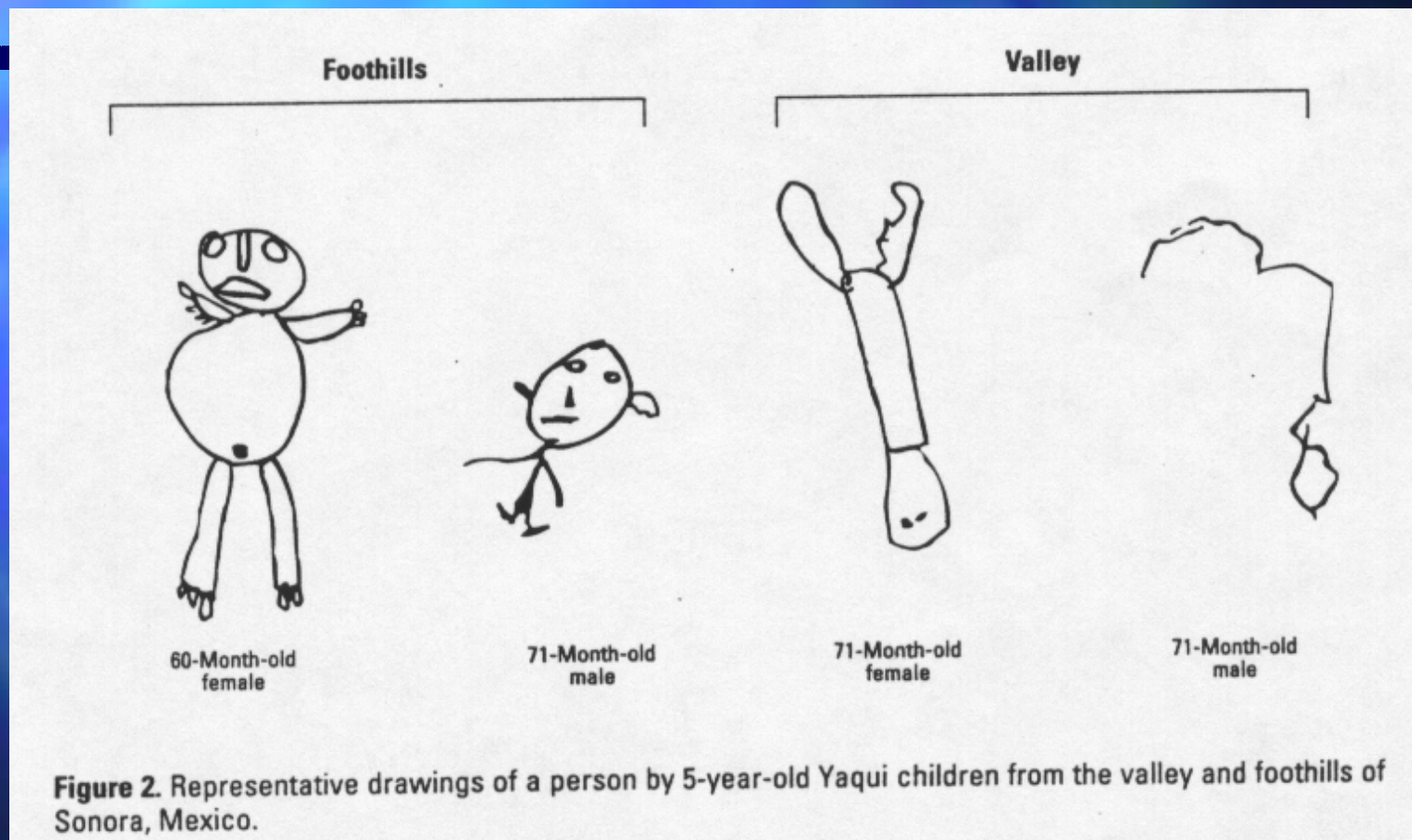
- Fetal mercury exposure may impair learning, memory and attention
- Solvents may adversely impact motor and cognitive skills
- Dioxin and PCBs affect brain development and function
- Small exposures to some pesticides at certain times can permanently alter brain activity

# Yaqui Indian Study

- **Effects of pesticide exposure on kids' development**
- **Controlled study of Yaquis using pesticides and those that do not**
- **Exposed kids had diminished stamina, poor memory impairment and drew distorted pictures**

■ **Elizabeth Guillette, Ph.D., University of Arizona**

# Chronic Pesticide Exposure



(Guillette, et. al., *An Anthropological Approach to the Evaluation of Preschool Children Exposed to Pesticides in Mexico*, Environmental Health Perspectives, Vol. 106, No. 6, June 1998)

# Another example:

## PCB Effects on Thyroid Hormone

### ■ Altered thyroid hormone

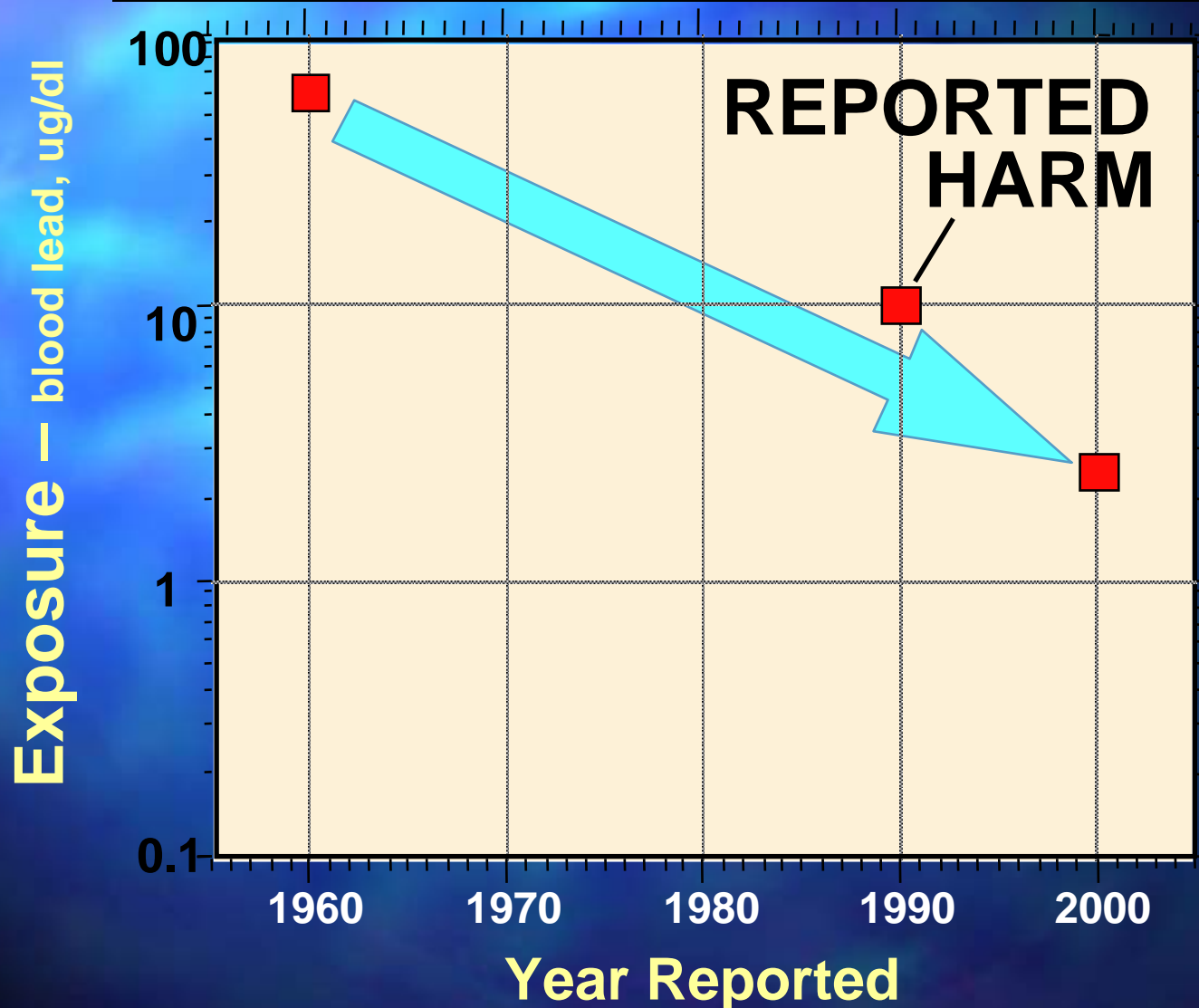
Mothers: ↓ Thyroid Hormone, ↑ Thyroid Stimulating Hormone (TSH)

Infants: ↓ Thyroid Hormone, ↑ TSH

### ■ Developmental Implications

Elevated maternal TSH during pregnancy, with or without reductions of thyroid hormone, associated with reduced IQ at age 7-9 yrs.

# DECLINING THRESHOLD OF HARM - LEAD

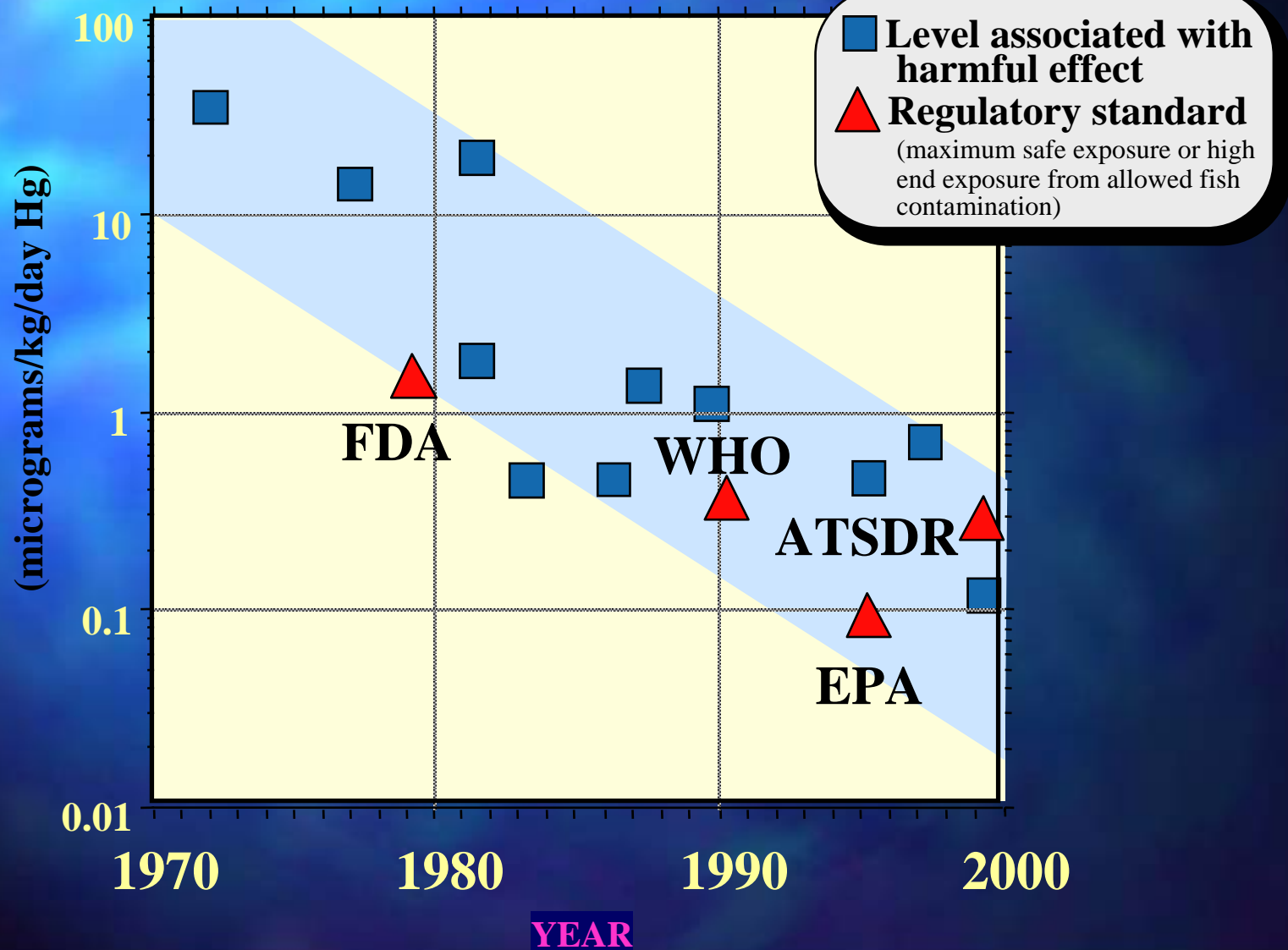


Note: Exposures expressed in micrograms/deciliter (blood lead)

# MERCURY:

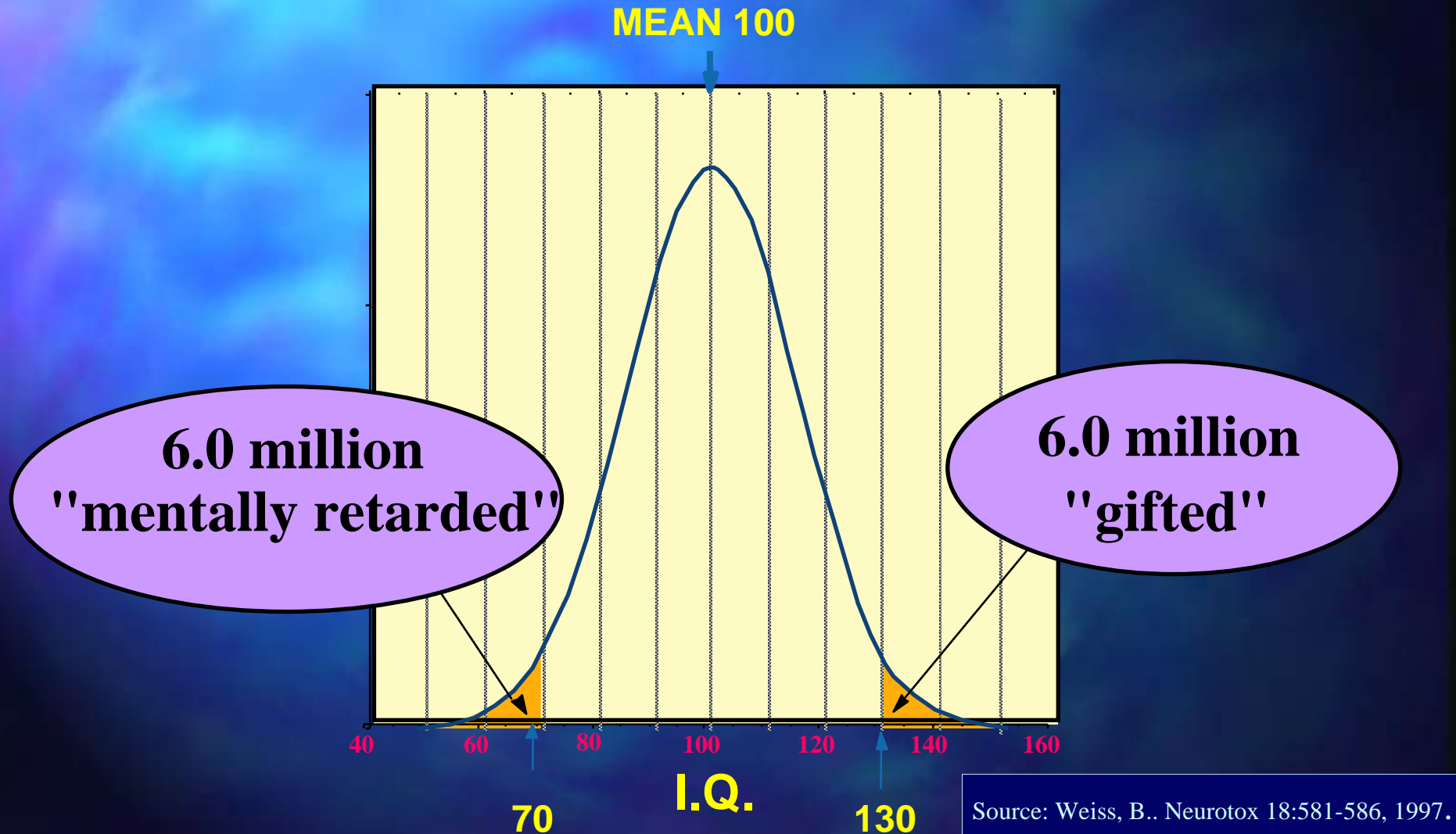
## Declining Threshold of Harm

DAILY INTAKE



# The Significance of Small Effects:

## Effects of a small shift in I.Q. distribution in a population of 260 million



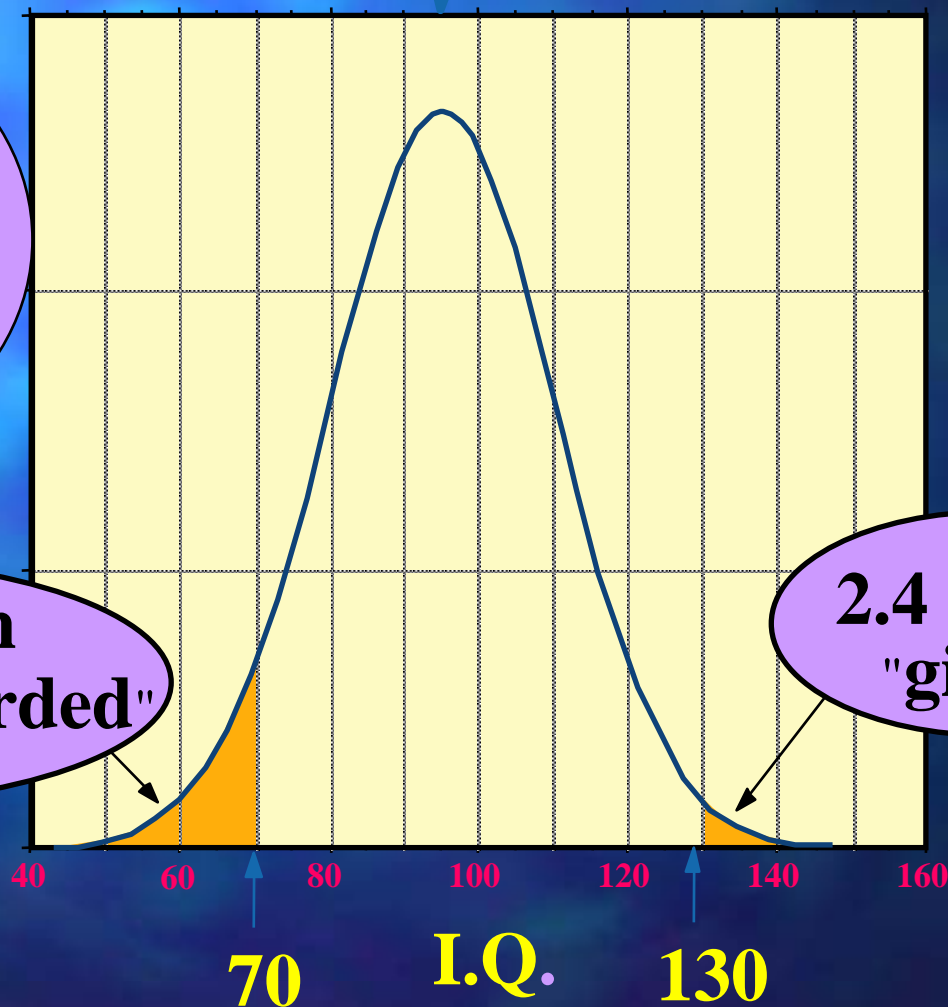
# 5 Point Decrease in Mean IQ

Mean I.Q. 95

**57% INCREASE**  
*in*  
**"Mentally Retarded"**  
**Population**

**9.4 million**  
**"mentally retarded"**

**2.4 million**  
**"gifted"**



# Precautionary Principle



- Taking preventative action in the face of uncertainty
- **Shifting the burden of proof to the proponents of an activity**
- **Exploring alternatives and using the least toxic alternative available**
- **Increasing public participation in decision-making**

# New and Emerging Research

- National Institute for Environmental Health Sciences (NIEHS) has opened 12 new research centers in US - \$37 million to look at pesticide impact on child behavior and developing nervous system (University of WA)
- Centers for Disease Control - Second body-burden report released in January 2003 on over 100 chemicals; next report due in January 2005.
- National longitudinal study to be launched - pre-natal to 20-years-old review of environmental exposures and health impacts

# Learning and Developmental Disabilities Initiative

- Educating state and national learning and developmental disabilities groups.
- Raising awareness among the groups' broader constituencies through workshops, presentations and dissemination of materials.
- Cultivating opportunities for interested groups to educate policymakers on specific bills that would eliminate neurotoxics.

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SEE: [www.iceh.org/lddi.html](http://www.iceh.org/lddi.html)

# LDDI: Specific Steps Forward

- LDA's Healthy Children's Project
  - State initiatives
  - Web site - [www.lidaamerica.org](http://www.lidaamerica.org)
- AAMR's Wingspread Conference
- LDDI Resolution
- Body Burden report on neurotoxics
- "Practice Prevention" columns
- Policy opportunities

# Some other web sites to check out

- [www.cheforhealth.org](http://www.cheforhealth.org) & [www.partnersforchildren.org](http://www.partnersforchildren.org) & (collaborations)
- [www.igc.org/psr](http://www.igc.org/psr) (research)
- [www.healthyschools.org](http://www.healthyschools.org) (schools)
- [www.checnet.org](http://www.checnet.org) (homes)
- [www.protectingourhealth](http://www.protectingourhealth) (science)
- [www.childenvironment.org](http://www.childenvironment.org) (science)
- [www.watoxics.org](http://www.watoxics.org) (WA state)